PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference MR/37770	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB 03/01850	International filing date *(day/month/year)* 30.04.2003	Priority date *(day/month/year)* 01.05.2002
International Patent Classification (IPC) or both national classification and IPC F16K47/12		
Applicant ALPHA THAMES LTD ET AL.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
26.11.2003	10.08.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Christensen, J Telephone No. +31 70 340-2437

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/01850

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-10 as originally filed

Claims, Numbers

1-16 received on 21.05.2004 with letter of 19.05.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

V.1 Reference is made to the following document:

D1: US 5 495 963 A (MILLER SCOTT R. ET AL)

V.2 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

V.2.1 A valve (48") comprising a choke means defining at least one passageway (156a) and control means (152) for adjusting the size of the at least one passageway to adjustably choke a flow of fluid through the valve wherein the choke means includes spring means (156) with parts between which the at least one passage-way is situated whereby deformation of the spring means (156) by the control means alter the size of the at least one passageway for adjusting the flow through the valve.

V.2.2 The subject-matter of claim 1 differs from this known valve in that the spring means comprises a plurality of discrete spring elements arranged to bear directly or indirectly on each other.

V.2.3 The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

V.4 The problem to be solved by the present invention may be regarded as avoiding resonant vibration and/or to provide the spring means with different stiffness at different points along its length (claim 4).

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

By using a plurality of discrete spring elements bearing directly or indirectly on each other the resonant vibration is dampened and it is easy to make different stiffness of the spring means by using discrete spring elements with different spring caracteristics.
This solution is not shown in any of the prior art documents cited in the search

report and is not obvious for the man skilled in the art.

Claims 2 - 16 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

V.5 The subject-matter of claims 1-16 can be manufactured in industry, and thus looked upon as being industrially applicable.

CLAIMS

1. A valve (2) comprising a choke means defining at least one passageway (34) and control means (16,18,20) for adjusting the size of the at least one passageway to adjustably choke a flow of fluid through the valve wherein the choke means includes spring means (24) with parts between which the at least one passageway is situated whereby deformation of the spring means (24) by the control means alter the size of the at least one passageway for adjusting the flow of fluid through the valve.

2. The valve as claimed in claim 1, wherein the spring means (24) is configured such that the at least one passageway (34) includes confronting parts which act to direct parts of the fluid flow against each other to dissipate flow energy.

3. The valve as claimed in claim 1 or 2, wherein the spring means (24) is substantially cylindrical and the flow of fluid passes between a region (28) outside and a region (30) inside the spring means as it passes through the valve (2).

4. The valve as claimed in claim 1, 2 or 3, wherein the spring means (64) has different stiffnesses at different points along its length such that choking of the fluid flow through the at least one passageway occurs at different rates along its length as the control means (54,56) is adjusted.

5. The valve as claimed in any preceding claim, wherein the spring means comprises a coil spring (24), the at least one passageway (34) being defined between coils thereof and the control means (16,18,20) being arranged to vary an axial length thereof.

6. The valve as claimed in claim 5, wherein the spring means comprises plural coil springs substantially concentrically disposed.

7. The valve as claimed in any one of claims 1 to 4, wherein the spring means comprises a plurality of discrete spring elements (66) arranged to bear directly or indirectly on each other.

8. The valve as claimed in claim 7, wherein at least some of the spring elements (66) each include plural apertures (90) through which the fluid flows.

9. The valve as claimed in claim 8, wherein at least some of the apertures (90) of adjacent spring elements (66) substantially confront each other.

10. The valve as claimed in claim 7, 8 or 9, wherein the spring elements comprise spring washers (66).

11. The valve as claimed in claim 10, wherein the spring means (64) includes annular locating rings (78) interposed between adjacent spring washers (66).

12. The valve as claimed in claim 11, wherein the adjacent locating rings (78) include complementary confronting surfaces (80) which define one of said at least one passageway.

13. The valve as claimed in claim 12, wherein the spring washers (66) are disposed in an axial array with a central longitudinal axis (62) and the confronting surfaces (80) of the locating rings (78) are disposed at an oblique angle to the longitudinal axis.

14. The valve as claimed in claim 13, wherein the oblique angle is between 20° and 70°.

15. The valve as claimed in claim 8 and claim 13 or 14, wherein the spring washers which are at opposite ends of the axial array do not contain said apertures.

16. The valve as claimed in any one of claims 12 to 15, wherein radially inner or outer peripheries of the spring washers (66) have a first set of locating rings (78) interposed therebetween including said complementary confronting surfaces (80).

17. The valve as claimed in claim 16, wherein the other of the radially inner or outer peripheries of the spring washers (66) have a second set of locating rings (104) interposed therebetween including said complementary confronting surfaces.

18. The valve as claimed in claim 16, wherein the other of the radially inner or outer peripheries of the spring washers have locating rings (73) therebetween which merely act to hold the spring washers in position relative to each other.

19. The valve as claimed in any preceding claim, wherein full compression of the spring means (24) by the control means (16,18,20) acts to at least substantially close the at least one passageway (34) to thereby at least substantially prevent flow through the valve (2).